

A13
Cant

	Pull out force (Newton)
Prior art samples	71
Prior art samples	73
Example 5	453

2.) Adhesion to a conventional hose rubber compound:

	Pull out force (Newton)
Prior art sample	73
Example 5	922

In the Claims

Please cancel claims 13 and 14, and amend claims 1, 6, 7, 9, 11 and 15-20 as follows:

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1. (Once Amended) A coated metal reinforcement element for a polymeric or elastomeric material comprising: a metal reinforcement element having a metal surface; and a coating for the reinforcement element comprising a polymer deposited from a solvent selected from the group consisting of an aqueous solvent, alcoholic solvent or organic solvent and compatible with and co-polymerizable with said material to be reinforced, and bearing functional groups covalently bonded to the metal surface of said reinforcement element.

2. A coated metal reinforcement according to claim 1, wherein said polymer is deposited from an alcoholic solution.

3. A coated metal reinforcement according to claim 1, wherein said polymer is deposited from an organic solution.

4. A coated metal reinforcement according to claim 1, wherein said polymer is co-vulcanizable with said polymeric or elastomeric material to be reinforced.

5. A coated metal reinforcement according to claim 1, wherein said polymer is crosslinkable with said polymeric or elastomeric material to be reinforced.

Sub 17
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6. (Once Amended) A coated metal reinforcement element for a polymeric or elastomeric material comprising: a metal reinforcement element having a metal surface; and a coating for the reinforcement element comprising a polymer deposited from a solvent selected from the group consisting of an aqueous solvent, alcoholic solvent or organic solvent and compatible with and co-polymerizable with said material to be reinforced, and bearing functional groups covalently bonded with the outward directed first functional groups of a mono-molecular layer of a bifunctional adhesion promoter intercalated between said metal and said coating and bound to said metal by its second functional groups.

7. (Once Amended) A coated metal reinforcement element for a polymeric or elastomeric material comprising: a metal reinforcement element having a metal surface; and a coating for the reinforcement element comprising a polymer deposited from a solvent selected from the group consisting of an aqueous solvent, alcoholic solvent or organic solvent and compatible with and co-polymerizable with said material to be reinforced, and bearing functional groups covalently bonded with the outward directed first functional groups of a multi-molecular layer of a bifunctional adhesion promoter intercalated between said metal and said coating and bound to said metal by its second functional groups.

8. A coated metal reinforcement element according to claim 1, wherein said coated metal reinforcement element is an elongated steel element.

A18 Sub B3
9. (Once Amended) A coated metal reinforcement element according to claim 8, wherein said elongated steel element is coated with one or more metallic layers, an alloy selected from the group consisting of brass, bronze, zinc, zinc alloy, tin or tin alloy.

10. A coated metal reinforcement element according to claim 9, wherein said zinc alloy is an alloy selected from the group consisting of a zinc-aluminium alloy, a zinc-aluminium-mischmetal alloy, a zinc-manganese alloy, a zinc-cobalt alloy, a zinc-nickel alloy, a zinc-iron alloy or a zinc-tin alloy.

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11. (Once Amended) A coated metal reinforcement element for a polymeric or elastomeric material comprising: a metal reinforcement element having a metal surface; and a coating for the reinforcement element comprising a prepolymer deposited from an aqueous solution and compatible with and co-polymerizable with said polymeric or elastomeric material to be reinforced, and bearing functional groups covalently bonding to the metal surface of said reinforcement element.

12. A coated metal reinforcement element according to claim 1, wherein the polymer of the coating comprises a polymer matrix selected from the group consisting of thermoplastics, thermoplastic elastomers, thermoplastic polyolefins, olefinic rubbers, polyurethanes or blends thereof, elastomeric polymers or copolymer or an at least partially elastomeric block copolymer.

13. (Cancelled)

14. (Cancelled)

Sub 15. (Once Amended) A coated metal reinforcement element according to claim 12, wherein the elastomeric block copolymer is selected from the group consisting of styrene butadiene rubber, butyl rubber, acrylonitrile butadiene rubber, ethylene propylene dien copolymer, ethylene propylene copolymer, natural rubber, synthetic poly(isoprene) and chloroprene rubber, or a functionalized non-cured rubber composition.

16. (Once Amended) A coated metal reinforcement element according to claim 12, wherein the non-cured rubber composition is selected from the group consisting of a synthetic or natural poly(isoprene) or poly (butadiene) and includes common vulcanization additives and curing materials.

A 20 17. (Once Amended) A coated metal reinforcement element according to claim 1, wherein the functional group include thiol groups, mercapto groups, silanes, amines, -SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -Si(R'(Cl)₂); -Si(OR')₃; -Si(R'(OR')₂); -COOH; -COCl; -PO₃H₂; -SO₂H, their acid anhydride and their acid chloride groups, organometallic groups of the formula -M(OR')_n or -M(Cl)_n, whereby M is a metal selected from the group consisting of Al, Sn, B, Ti or V, n being the ligand number corresponding to the metal M, phthalocyanine or phthalonitrile groups, monothiol or monothiolate groups, wherein R' is alkyl, methyl, ethyl or propyl in case of a bonding directly to the metal surface; all these functional groups either as terminal groups or carried along the polymer backbone or as part of side chains, further including epoxy groups carried along the polymer backbone.

18. (Once Amended) A coated metal reinforcement element according to claim 1, further including an adhesion promoter that is a bifunctional compound of the general formula (I)



with X representing a group capable of reacting covalently at the metal surface,

R representing an organic spacer chain,

Ar representing an aromatic and/or heteroaromatic system,

Y representing a group capable of forming covalent bonds to a group selected from polymer or prepolymer of the coating, and

$0 \leq n, m \leq 16; 0 \leq l \leq 6$.

19. (Once Amended) A coated metal reinforcement element according to claim 18, wherein the general formula (I) are as follows:

X: -SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -Si(R'(Cl)₂); -Si(OR')₃; -Si(R'(OR')₂); -COOH; -COCl; -PO₃H₂; -SO₂H, their acid anhydride and their acid chloride groups

an organometallic group of the formula -M(OR')_n or whereby M is a metal selected from the group consisting of Al, Sn, B, Ti or V, n being the ligand number corresponding to the metal M;

a phthalocyanine or a phythalonitrile group;

a monothiol or a monothiolate group;

with R' being alkyl, namely methyl, ethyl or propyl,

Y: NH₂, NHR', or NR'₂, or an unsaturated residue, having an unsaturated terminal double or triple carbon-carbon bond; an acrylic or methacrylic acid group and is methyl or ethyl esters;

-CN; an activated carboxylic ester; an aldehyde group; an epoxide group;

-SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -Si(R'(Cl)₂); -Si(OR')₃; -Si(R'(OR')₂); -COOH; -COCl; or a functional group capable of forming a complex with at least one ingredient of a non-metallic medium;

R: -CH₂-; a -(CH₂)_n-chain, whereby $2 \leq n \leq 20$ and whereby said chain may be unhalogenated, partially halogenated or perhalogenated and may contain aromatic or thiophen units, and whereby the chain and/or the units may comprise substituents selected from the group consisting of:

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Cost

~~-(CH₂)_iCH₃ with 0 ≤ i ≤ 5, -O(CH₂)_jCH₃, or -O(CF₂)_jCH₃ with 0 ≤ j ≤ 4,
-CN and -NH₂; -CF₂-; -CH₂-CO-NH-CH₂-; -CF₂-CO-NH-CF₂-; -CH₂-CO-NH-
CF₂-; CF₂-CO-NH-CH₂- or 0 ≤ n,m ≤ 16,~~

~~AR: an aromatic and/or heteroaromatic system, substituted, for the substituents.~~

20. (Once Amended) A coated metal reinforcement element according to claim 1, including a layer of a polymeric or non-cured elastomeric composition on top of said coating for further reinforcement.

21. A coated metal reinforcement element according to claim 20, wherein the non-cured elastomeric composition of the additional layer is a vulcanizable rubber composition.